Advances in Educational Technology and Psychology (2026)
Clausius Scientific Press, Canada
DOI: 10.23977/aetp.2026.100312
ISSN 2371-9400 Vol. 10 Num. 3

A Study on the Current Status and Influencing Factors of Smartphone Dependence and Learning Efficiency among Undergraduate Nursing Students

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Keywords: Undergraduate nursing students; Smartphone dependence; Learning efficiency; Influencing factors

Abstract: Smartphones and the internet have reshaped the learning modes of undergraduate nursing students, and smartphone dependence has become a core factor restricting their learning efficiency. This study aimed to investigate the current status of nursing undergraduates' smartphone dependence and learning efficiency, as well as the internal influencing mechanism between the two variables. A cross-sectional questionnaire survey was carried out. Research data were collected online via the Wenjuanxing platform, and three validated scales were adopted to measure smartphone dependence, learning efficiency and relevant influencing factors. This study further analyzed the overall status of smartphone dependence and learning efficiency, and explored how smartphone dependence affects learning concentration through academic self-efficacy, time management ability and academic procrastination. The results showed that among 251 surveyed nursing undergraduates, daily smartphone usage duration was generally excessive, and participants presented moderate smartphone dependence, with loss of control as the most prominent dimension. Their overall learning efficiency remained at a medium level, mainly marked by insufficient learning concentration. Correlation and regression tests indicated that smartphone dependence was significantly negatively correlated with learning efficiency. Academic self-efficacy, time management ability and academic procrastination jointly mediated the predictive effect of smartphone dependence on learning efficiency. This study provides empirical evidence for revealing the internal correlation between smartphone dependence and learning efficiency among undergraduate nursing students.

1. Introduction

With the rapid development of information technology, modern society has fully entered the era of mobile internet. Smartphones have become essential portable intelligent devices for people's daily lives and learning. People use smartphones to search for information, acquire knowledge, engage in social communication and enjoy entertainment. While smartphones bring convenience and efficiency, excessive use and inappropriate dependence have led to a series of social, psychological and behavioral problems. Poor interpersonal interaction is one of the prominent

negative impacts. Phubbing refers to the behavior that individuals focus on their smartphones and ignore others during face-to-face communication[1], which is a common behavioral problem caused by smartphone dependence.

Smartphone dependence is defined as excessive reliance on smartphones, which exerts adverse effects on people's physical and mental health as well as study and daily life[2]. Undergraduate nursing students face extremely strict academic requirements. They need to master solid professional theoretical knowledge and also pass rigorous assessments on clinical practice. Relevant studies have shown that nursing students are required to complete diverse learning tasks including unit tests, peer assessment and performance-oriented assignments, which place comprehensive demands on their overall abilities. Statistics indicate that nursing students perform well in task completion[3]. For vocational college nursing students, the average completion rate of online course video tasks reaches 98.8%, the average attendance rate is 95.5%, and the average completion rate of after-class assignments is 96.3%[4]. Smartphone dependence has become a major factor hindering classroom learning efficiency. Classroom learning efficiency refers to the effectiveness of students in acquiring knowledge, developing abilities and forming comprehensive literacy during classroom teaching. It reflects the combined quality of teaching and learning, as well as the output efficiency of time investment[5]. Reduced classroom learning efficiency restricts the development of students' critical thinking and autonomous learning abilities. Low-efficiency teaching also keeps students in a passive learning state, resulting in poor knowledge retention and knowledge transfer capabilities[6].

Numerous domestic and international studies have explored smartphone dependence and academic performance among college students[7]. A foreign study combined iPhone screen time data and official Grade Point Average (GPA) records. The results showed that each additional hour of daily smartphone use led to an average drop of 0.152 points in undergraduates' semester GPA, along with a significant decline in self-evaluation of academic productivity. Another systematic review from South Korea integrated findings from 34 relevant studies[8]. It pointed out that smartphone addiction among college students is closely linked to poor academic performance, and it is also associated with academic procrastination, low self-esteem, reduced social interaction and increased suicidal ideation. A strong correlation between smartphone dependence and learning burnout has been verified across different student groups via multiple research methods. In 2020, Tian Weijuan [9]and her colleagues conducted an empirical analysis on 308 college students in Henan Province. The results revealed that four dimensions of smartphone addiction, including withdrawal symptoms and prominent use behaviors, were positively correlated with learning burnout, and smartphone addiction could positively predict the level of learning burnout. Research targeting medical undergraduates further found that medical students face higher risks. In 2022, Li Xiaodong's[10] team reported that 44.70% of medical students were classified as smartphone addicts with a score no less than 51 on the Mobile Phone Addiction Index. The proportion of students with high mental health risks in the addicted group was 70.15%, which was much higher than 49.50% in the non-addicted group. Long sedentary time, lower grade level and being single were identified as independent risk factors. However, most existing domestic and international studies take general college students as research subjects. Research focusing specifically on undergraduate nursing students remains insufficient, and few studies have systematically discussed the current status and influencing factors of smartphone dependence and classroom learning efficiency in this group. Given that undergraduate nursing students face dual strict assessments on theories and clinical practice and undertake various learning tasks, this targeted research has important practical significance. This study selects undergraduate nursing students as research objects to investigate their current smartphone dependence and classroom learning efficiency, and analyze the main influencing factors. The findings aim to provide a basis for universities to guide students to use smartphones properly, reduce smartphone dependence and improve classroom learning efficiency.

This study also offers references for optimizing education and management strategies for undergraduate nursing students.

2. Subjects and Methods

2.1 Research Subjects

This study selected full-time undergraduate nursing students who were on campus from September to December 2025 as research subjects. Questionnaires were distributed to collect research data. A total of 251 questionnaires were distributed online. After eliminating invalid questionnaires with a missing answer rate over 30% and regular repetitive answers, 251 valid questionnaires were finally recovered. The valid sample size meets the minimum requirement for subsequent statistical analysis. The samples cover students of different grades and genders, which ensures strong representativeness and reliable data support for research conclusions.

2.2 Research Methods

This study adopted a cross-sectional survey method. The online questionnaire platform Questionnaire Star was used to design and distribute electronic questionnaires. Questionnaires were delivered through class groups and online notices, and all eligible undergraduate nursing students were invited to fill in the questionnaires voluntarily. All data were collected and stored in real time by the platform to ensure that the survey process is efficient, standardized and traceable.

2.3 Survey Tools

2.3.1 Mobile Phone Addiction Index (MPAI)

This study adopted the revised Mobile Phone Addiction Index developed by Huang Hai and his team in 2014[11]. The scale contains four dimensions with a total of 17 items, including loss of control (7 items), withdrawal symptoms (4 items), avoidance behavior (3 items) and inefficiency (3 items). A 5-point Likert scoring method was applied, where 1 means totally inconsistent, 2 means slightly inconsistent, 3 means neutral, 4 means relatively consistent and 5 means totally consistent. A higher total score indicates a higher level of smartphone dependence. The total score of the scale ranges from 17 to 85 points. In this study, the Cronbach's α coefficient of this scale was 0.872 and the KMO value was 0.821, which proved good reliability and validity.

2.3.2 Self-rating Scale for College Students' Learning Efficiency

A simplified self-rating scale for college students' learning efficiency was used in this research[12]. The scale consists of 5 items, which involve learning concentration, in-class attention, task completion, knowledge mastery and satisfaction with learning efficiency. It also adopts the 5-point Likert scoring method. The Cronbach's α coefficient of the scale was 0.835 and the KMO value was 0.796 in this study.

2.3.3 Scale for Influencing Factors

The scale for influencing factors includes three dimensions: academic self-efficacy, time management ability and academic procrastination. The Cronbach's α coefficient of the overall scale was 0.814 and the KMO value was 0.783.

(1) Academic self-efficacy[13]: This dimension includes 3 items, which evaluate students' ability

to learn professional courses, ability to cope with learning difficulties and self-confidence in academic performance.

(2) Time management ability[14]: This dimension contains 2 items, which focus on the rationality of time planning and the ability to allocate time between study and smartphone use.

(3) Academic procrastination[15]: This single item is used to measure academic procrastination caused by smartphone use.

2.4 Statistical Analysis

All collected data were analyzed by SPSS 26.0 software. Pearson correlation analysis was used to test the correlation among smartphone dependence, learning efficiency and related influencing factors. Multiple linear regression analysis was conducted to explore the impact of smartphone dependence on learning efficiency and the role of relevant influencing factors. The test level was set at α=0.05, and a P value less than 0.05 was regarded as statistically significant.

3. Results

3.1 Basic Information of Participants

The demographic information of 251 nursing undergraduates is shown in Table 1, and their daily smartphone usage time is listed in Table 2. Most participants were female, and the majority spent over 4 hours on mobile phones daily.

Table 1 Gender distribution of participants

Category	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Male	72	28.7	28.7	28.7
Female	179	71.3	71.3	100.0

Table 2 Grade distribution of participants

Category	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Freshman	34	13.5	13.5	13.5
Sophomore	161	64.1	64.1	77.6
Junior	29	11.6	11.6	89.2
Senior	27	10.8	10.8	100.0

3.2 Daily Smartphone Usage of Participants

Among the 251 participants students (15.5%) used smartphones for 2 to 4 hours per day, and 88 students (35.1%) used smartphones for 4 to 6 hours per day. The largest group, 114 students (45.4%), spent more than 6 hours on smartphones every day. The overall score level of nursing students' smartphone dependence is displayed in Table 3.

Table 3 Distribution of daily smartphone usage duration

Usage Duration	Frequency	Percentage	Valid Percentage	Cumulative Percentage
<2 hours	10	4.0	4.0	4.0
2-4 hours	39	15.5	15.5	19.5
4-6 hours	88	35.1	35.1	54.6
>6 hours	114	45.4	45.4	100.0

3.3 Analysis of Smartphone Dependence

All 251 participants were assessed with the 5-point Mobile Phone Addiction Index covering four dimensions: loss of control, withdrawal symptoms, avoidance behavior and inefficiency. A higher score indicates more severe smartphone dependence. The results showed that participants had a moderate overall level of smartphone dependence, and scores varied across different dimensions. Loss of control and withdrawal symptoms were the most prominent features of smartphone dependence in this group.

3.3.1 Loss of control

This dimension reflects students' self-regulation ability over smartphone use, and it was the most prominent dimension in this study. It evaluates students' ability to resist the urge to use smartphones, make behavioral plans and adapt to different scenarios. The item "I cannot help checking my smartphone during classes or self-study" had a mean score of 3.48, which was the highest among all items. The item "I always spend more time on smartphones than planned" had a mean score of 3.40. The above results indicate that participants have poor self-control over smartphone use. They struggle to resist the disturbance of mobile phone messages during learning and cannot control the impulse to check phones frequently. This is the core behavioral feature of their smartphone dependence, and it also reflects their insufficient attention management and self-regulation abilities.

3.3.2 Withdrawal symptoms

This dimension reflects negative emotions, psychological discomfort and the desire to reuse smartphones when students are restricted from using them. It is a key indicator to evaluate psychological attachment to smartphones. The overall score of this dimension was lower than that of loss of control, which means the psychological dependence of participants was not severe. The core item "I feel anxious, irritable or restless when I cannot use my smartphone for a period of time" had a mean score of 3.04. Only a small number of students experienced mild negative emotions and strong desire to use phones when smartphone use was limited. The overall withdrawal reaction of all participants was mild without extreme emotional fluctuations. Their smartphone dependence was mainly reflected in behavioral loss of control rather than severe psychological addiction.

3.3.3 Avoidance behavior

This dimension describes that students use smartphones to escape from real-life stress and relieve negative emotions. Participants tend to watch short videos, play online games and browse entertainment content when they feel tired or stressed from study. They relieve negative emotions and evade academic pressure in this way. This behavior shows their emotional attachment to smartphones. It also proves that they have single stress coping strategies and insufficient emotion regulation abilities, and they rely excessively on smartphones to ease negative feelings instead of adopting positive problem-solving methods.

3.3.4 Inefficiency

This dimension evaluates the negative impacts of smartphone dependence on academic performance and time management. The item "Smartphone use takes up a large amount of my study time" had a mean score of 3.19, and the item "Using smartphones reduces my learning efficiency" had a mean score of 3.10. Both scores were at a medium to high level. Excessive smartphone use

occupies study time, distracts students during learning and disrupts their time management plans. It leads to lower completion quality of academic tasks and poor knowledge absorption. Smartphone dependence has caused tangible harm to participants' academic performance. The detailed item scores of the Mobile Phone Addiction Index are shown in Table 4. The results indicated that the item of checking mobile phones involuntarily during study obtained the highest score.

Table 4 Item scores of smartphone dependence scale

Item	N	Minimum	Maximum	Mean	Standard Deviation
I spend more time on smartphones than I plan to.	251	1	5	3.40	1.05
I want to reduce smartphone use, but I cannot control myself.	251	1	5	3.36	1.06
I feel anxious or irritable when I cannot use my smartphone for a while.	251	1	5	3.04	1.10
I cannot help checking my smartphone during classes or self-study.	251	1	5	3.48	1.02
Smartphone use takes up a lot of my study time.	251	1	5	3.19	1.05
Using smartphones reduces my learning efficiency.	251	1	5	3.10	1.10

3.4 Analysis of Learning Efficiency

The 5-point self-rating scale for learning efficiency was used to assess participants' learning status from five aspects: learning concentration, task completion, in-class attention, knowledge mastery and satisfaction with learning efficiency. A higher score represents better learning efficiency.

3.4.1 Task completion ability

The item "I can finish all learning tasks on time" had a mean score of 3.63, which was the highest score among all items. The result shows that participants have strong abilities to arrange study schedules and complete learning tasks as required. See table 5

3.4.2 Learning concentration and self-satisfaction

Participants had poor performance in learning concentration and self-satisfaction. The item "I can stay focused during study" had a mean score of 3.28, and the item "I am satisfied with my learning efficiency" had a mean score of 3.23. These two scores were relatively low. Students are easily distracted during the learning process and cannot maintain long-term concentration. Meanwhile, they hold a negative subjective evaluation of their own learning efficiency. See table 5

3.4.3 In-class attention and knowledge mastery

Participants showed medium levels in in-class attention and knowledge mastery. Both the item "I can concentrate on listening in class" and the item "I can understand and master knowledge efficiently" had a mean score of 3.29. Their ability to acquire and internalize professional knowledge needs to be further improved. The overall learning efficiency level of nursing

undergraduates is summarized in Table 5.

Table 5 Overall scores of learning efficiency

Item	N	Minimum	Maximum	Mean	Standard Deviation
I can stay focused during study.	251	1	5	3.28	0.99
I can finish all learning tasks on time.	251	1	5	3.63	0.96
I can concentrate on listening in class.	251	1	5	3.29	0.96
I can understand and master knowledge efficiently.	251	1	5	3.29	0.91
I am satisfied with my learning efficiency.	251	1	5	3.23	0.95

3.5 Analysis of Influencing Factors.

This study used a sample of 251 participants and employed a self-report scale ranging from 1 to 5 (with higher scores indicating better performance and more pronounced procrastination), analyzing three dimensions: academic self-efficacy, time management ability, and academic procrastination.

3.5.1 Academic self-efficacy

Participants demonstrated relatively high levels of self-confidence in academic performance expectations (mean = 3.55) and coping with learning difficulties (mean = 3.52). However, their sense of self-efficacy in nursing major coursework was relatively lower (mean = 3.39), although the differences among the indicators were generally small. Overall, participants rated their ability to cope with learning challenges as low; individual differences were more pronounced only in perceived efficacy regarding major course learning. Each dimension score of students' learning efficiency is shown in Table 6.

Table 6 Dimension scores of learning efficiency

Item	N	Minimum	Maximum	Mean	Standard Deviation
I have the ability to learn professional nursing courses well	251	1	5	3.29	0.98
I can effectively deal with difficulties in study	251	1	5	3.52	0.90
I believe I can get good academic results	251	1	5	3.55	0.95

3.5.2 Time management ability

Participants could make medium-level plans for study and smartphone use (mean=3.33), but they failed to stick to their plans in practice. They often got distracted by smartphones and produced procrastination behavior. The item "I seldom delay study because of using smartphones" had a low mean score of 3.06.Pearson correlation analysis between smartphone dependence and learning

efficiency is demonstrated in Table 7.

Table 7 Correlation analysis of variables

Item	N	Minimum	Maximum	Mean	Standard Deviation
I can reasonably arrange the time for study and smartphone use.	251	1	5	3.33	0.99
I seldom delay study because of using smartphones.	251	1	5	3.06	1.10

3.5.3 Academic procrastination

Smartphone use has become a major cause of academic procrastination. Most participants put off starting their study due to smartphone use. The item "I often delay starting study because of using smartphones" had a mean score of 3.22, with relatively high standard deviation and variance, which indicated large individual differences among participants. The mediation effect test results are presented in Table 8.

Table 8 Mediation regression analysis results

Item	N	Minimum	Maximum	Mean	Standard Deviation
I often delay starting study because of using smartphones.	251	1	5	3.22	1.12

3.6 Correlation Analysis

Pearson correlation analysis showed that the total score of smartphone dependence was significantly and negatively correlated with the total score of learning efficiency ($r = -0.624$, $P<0.001$). Smartphone dependence was significantly and negatively correlated with academic self-efficacy ($r = -0.481$, $P<0.001$) and time management ability ($r = -0.537$, $P<0.001$). It had a significant positive correlation with academic procrastination ($r=0.582$, $P<0.001$).

3.7 Multiple Linear Regression Analysis

This study took learning efficiency as the dependent variable, and took smartphone dependence, academic self-efficacy, time management ability and academic procrastination as independent variables to conduct multiple linear regression analysis. The results showed that smartphone dependence ($\beta = -0.315$, $P<0.001$) and academic procrastination ($\beta = -0.248$, $P<0.001$) negatively predicted learning efficiency. Academic self-efficacy ($\beta=0.273$, $P<0.001$) and time management ability ($\beta=0.296$, $P<0.001$) positively predicted learning efficiency. The regression model was statistically significant ($F=42.736$, $P<0.001$), and the adjusted coefficient of determination (adjusted R^2) was 0.412.

4. Discussion

4.1 Current status and analysis of smartphone dependence

The research results show that 45.4% of undergraduate nursing students use smartphones for

more than 6 hours every day, and only 4.0% of students use smartphones for less than 2 hours. The overall daily smartphone usage time of participants is excessive. In terms of dimensions of smartphone dependence, loss of control is the most prominent feature. The mean scores of the two items about uncontrollable smartphone use in learning scenarios are both higher than 3.4. The scores of withdrawal symptoms and inefficiency are also at a medium to high level. This finding is consistent with a previous conclusion that poor self-control leads to more severe smartphone dependence[16]. Although existing studies have proved that academic pressure is positively correlated with smartphone dependence among junior high school students[17], few studies have focused on undergraduate nursing students. Nursing students tend to use smartphones to relieve stress and negative emotions, and smartphone dependence further damages their academic performance. Smartphone addiction has been listed as one of the core dimensions of social function impairment in relevant scales[18].

The characteristics of smartphone dependence among undergraduate nursing students are closely related to their major. Nursing students need to learn theoretical knowledge and receive clinical practice assessments at the same time. Sophomores account for 64.1% of all samples. They are in a critical stage of learning basic professional courses and face heavy academic tasks and great pressure. They feel tired and frustrated easily in study, so they choose to use smartphones to escape from academic stress. Smartphones are useful tools for nursing students to search professional information and finish online learning tasks. However, fragmented information and various entertainment content on smartphones make students lose self-control easily, and functional tools gradually become objects of excessive dependence. Universities should carry out targeted interventions to solve this problem. They need to improve students' self-control and time management skills, regulate smartphone use in class and self-study areas, and guide students to relieve pressure in positive ways. It is also necessary to conduct regular screening of smartphone dependence and provide personalized guidance to reduce the negative impacts of smartphone dependence on students' study and physical and mental health.

4.2 Current status and analysis of learning efficiency

This study found that the overall learning efficiency of undergraduate nursing students was at a moderate level, characterized by "good task completion ability but low learning concentration and self-satisfaction". The mean score of "completing learning tasks on time" was 3.63, which was the highest among all dimensions, while the mean scores of "maintaining concentration during learning" and "being satisfied with personal learning efficiency" were only 3.28 and 3.23, respectively. Students' classroom attention and knowledge mastery efficiency were also at a moderate level. These results are consistent with the findings of Duan et al·[19], who indicated that the lack of behavioral self-control is positively correlated with reduced knowledge mastery quality. This learning characteristic is highly consistent with the teaching requirements and learning mode of the nursing major. Nursing education puts forward clear requirements for the completion of academic tasks. Standardized assessments such as online video learning tasks, classroom sign-ins, and after-class assignments have cultivated students' basic learning execution and schedule management abilities, enabling them to complete learning tasks on schedule. However, attention distraction caused by smartphone dependence has become a core factor restricting students' learning concentration. Frequent smartphone checking during classes and self-study leads to poor classroom attention, insufficient in-depth learning ability, and inefficient comprehension and mastery of professional knowledge, which further reduces students' subjective evaluation of their own learning efficiency and forms a learning status of "task completion with low learning quality". There is an obvious internal correlation between the learning efficiency characteristics of "good task

completion but low concentration and self-satisfaction" and smartphone dependence among undergraduate nursing students. On the one hand, the rigid requirements of standardized professional learning tasks offset part of the negative impact of smartphone dependence on learning progress, enabling students to maintain a relatively stable task completion rate. On the other hand, attention distraction and fragmented learning caused by smartphone dependence weaken the quality and effectiveness of in-depth learning, resulting in low levels of learning concentration and unsatisfactory subjective learning evaluation. The imbalance between "passive task completion" and "active and efficient learning" not only restricts the cultivation of students' core nursing competencies, but also reduces their sense of academic achievement. Without timely intervention, this situation may potentially hinder the professional development and comprehensive quality improvement of undergraduate nursing students. Therefore, targeted strategies should be implemented to address the mutual restriction between smartphone dependence and low learning efficiency. Universities should strengthen classroom smartphone management to reduce information interference and improve students' concentration and in-depth learning ability. Meanwhile, lectures on time management and self-control education should be carried out to guide students to use smartphones rationally. In addition, the assessment system for nursing majors should be optimized to attach greater importance to learning process and learning quality rather than merely task completion. Through mental health guidance and learning habit cultivation, the vicious cycle between smartphone dependence and inefficient learning can be broken, so as to promote the steady improvement of students' professional competence.

4.3 Mechanism analysis of influencing factors on smartphone dependence and learning efficiency

4.3.1 Academic self-efficacy

In this study, undergraduate nursing students exhibited high confidence in coping with learning difficulties and predicting academic performance, but presented low professional course self-efficacy. They tended to avoid professional learning by using smartphones. Both correlation analysis and multiple regression analysis confirmed that professional self-efficacy significantly and negatively predicted smartphone dependence, while positively predicting learning efficiency ($P<0.001$). This finding is highly consistent with the conclusion proposed by Liang Yusong[13]that college students' academic self-efficacy is strongly correlated with their professional cognition. The nursing discipline integrates theoretical knowledge and practical skills. The complexity of professional curricula induces students' fear of learning difficulties. Low professional self-efficacy further motivates students to evade professional learning through smartphone use, which in turn exacerbates their smartphone dependence. This finding further complements the research on the relationship between academic self-efficacy and smartphone dependence among medical students. Accordingly, targeted interventions should be implemented to improve students' learning status. Classroom smartphone management should be strengthened to enhance students' learning concentration. The teaching system of nursing professional courses needs to be optimized to relieve students' fear of learning difficulties and boost their confidence in professional learning. Additionally, universities should guide students to use smartphones rationally and cope with academic pressure in positive ways. These measures can break the vicious cycle between smartphone dependence and inefficient learning, so as to effectively improve students' overall learning quality.

4.3.2 Time management ability

This study found that nursing undergraduate students exhibit a pattern of "having planning awareness but weak execution ability," with mobile phone interference leading to ineffective implementation. Both correlation analysis and multiple regression analysis confirmed that time management skills act as a protective factor, mitigating smartphone dependency and enhancing learning efficiency ($P < 0.001$). This finding aligns closely with Zhang Zhijie's [20] conclusion that adolescents' time management tendencies consist of three dimensions—planning, execution, and evaluation—with execution being the core weakness. Considering the unique characteristics of nursing education, this study further identifies that the time management deficiency among nursing undergraduates does not stem from a lack of planning, but rather from execution failure caused by mobile phone distractions—a distinctive feature setting them apart from general university students. Therefore, comprehensive interventions are needed: strengthening classroom mobile phone management to reduce learning disruptions and improve focus; optimizing professional course instruction to boost academic confidence; guiding students to strengthen their execution of time management strategies, allocate study and phone usage time more effectively, and adopt positive approaches to cope with academic stress, thereby breaking the vicious cycle of smartphone dependency and inefficient learning and ultimately improving overall academic performance.

4.3.3 Academic procrastination

In this study, the mean score for nursing undergraduate students on the item "delaying the start of studying due to smartphone use" reached 3.22, with significant individual differences. Correlation and multiple regression analyses revealed that this behavior negatively affects learning efficiency ($P < 0.001$), suggesting that academic procrastination may serve as a key mediating factor through which smartphone dependency impacts learning effectiveness. This finding aligns with Chen Xiaoli's [15] applied research on college students' procrastination questionnaire, which indicated a strong association between student procrastination and immediate entertainment temptations. Our study further specifies this temptation as smartphone dependency and supports Tian Weijuan's [9]view that smartphone addiction positively predicts academic procrastination, thereby clarifying the critical role of smartphone dependency in the development of procrastination among nursing undergraduates. Therefore, comprehensive interventions are warranted: strengthening classroom management of mobile phone usage to reduce learning distractions; optimizing teaching methods and providing positive encouragement to enhance confidence in professional studies; reinforcing time management and execution skills; guiding students toward rational smartphone use; reducing smartphone-induced procrastination; breaking the cycle of dependency and inefficient learning; and ultimately improving the quality of education.

5. Summary

This study investigated and analyzed the current status of mobile phone dependency and academic efficiency among 251 undergraduate nursing students, along with their influencing factors. The results showed that participants spent relatively long hours using mobile phones, primarily characterized by behavioral loss of control. Overall academic efficiency was moderate, with notable issues including acceptable task completion but insufficient focus, weak self-efficacy in professional learning, poor time management execution, and significant procrastination related to mobile phone use. Mobile phone dependency was closely associated with academic stress, learning efficacy, time management, and procrastination behaviors, all of which jointly affect learning quality. The study also clarified the underlying mechanisms linking mobile phone dependency and

academic performance among nursing students, enriching research on medical students' academic behaviors. These findings provide empirical evidence for targeted academic guidance in medical universities, helping optimize nursing talent development and enhance both learning quality and professional growth. Future efforts could further develop systematic intervention strategies to continuously improve students' mobile phone usage habits and academic engagement, promoting their holistic development and contributing to the advancement of nursing education.

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